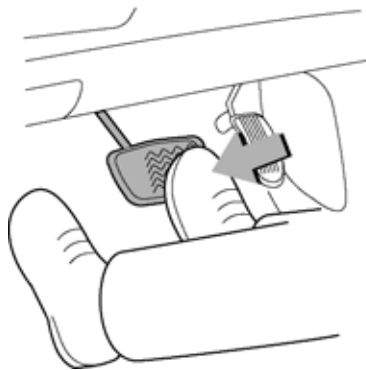
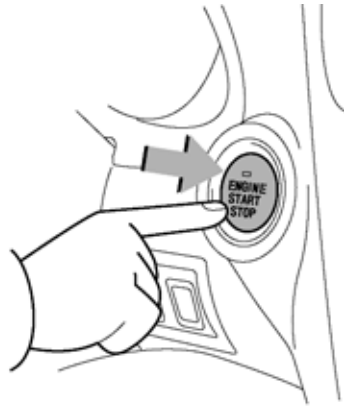


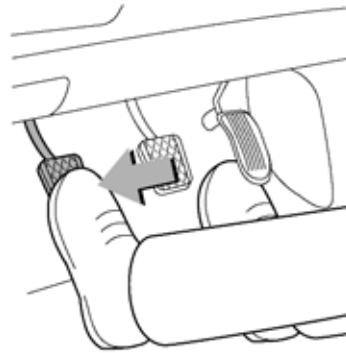
■ START FUNCTION

1. General

- Is operated by simply pressing the push-type engine switch while holding the key. The Power Source Control ECU turns OFF and ON the ACC, IG or ST CUT relays to switch (control) the power source.
- This function has different power source control patterns to suit the state of the brake pedal and shift lever position. For detail [see page BE-149](#). (A/T models)
- This function has different power source control patterns to suit the state of the clutch pedal and shift lever position. For detail [see page BE-150](#). (M/T models)
- Along with the adoption of the start function, an engine cranking hold function is used. For details, [see page EG-77](#).



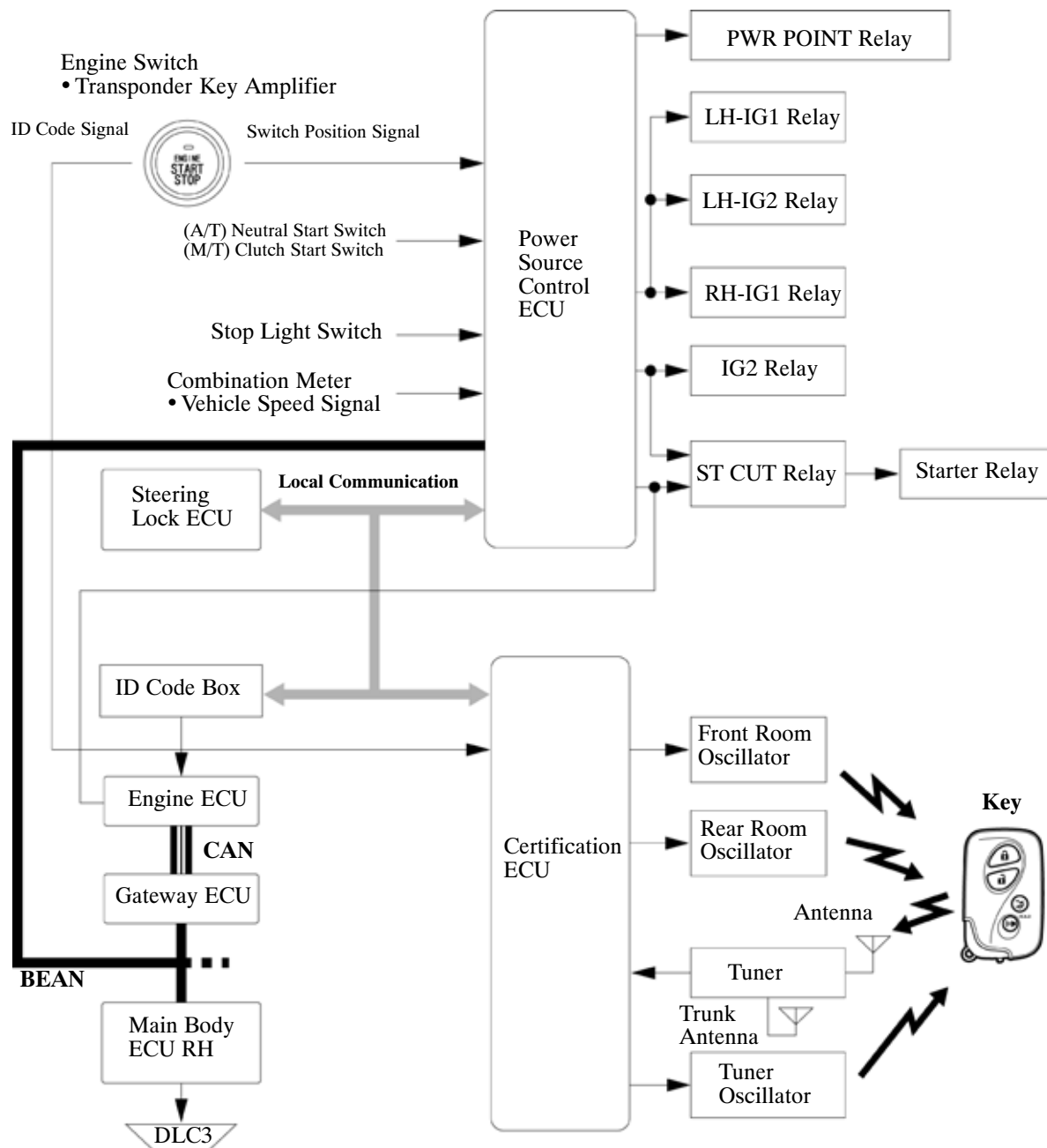
A/T models



M/T models

2. System Diagram

The Power Source Control ECU controls the push button start function. The system diagram below shows the components that relate to this function.



BE

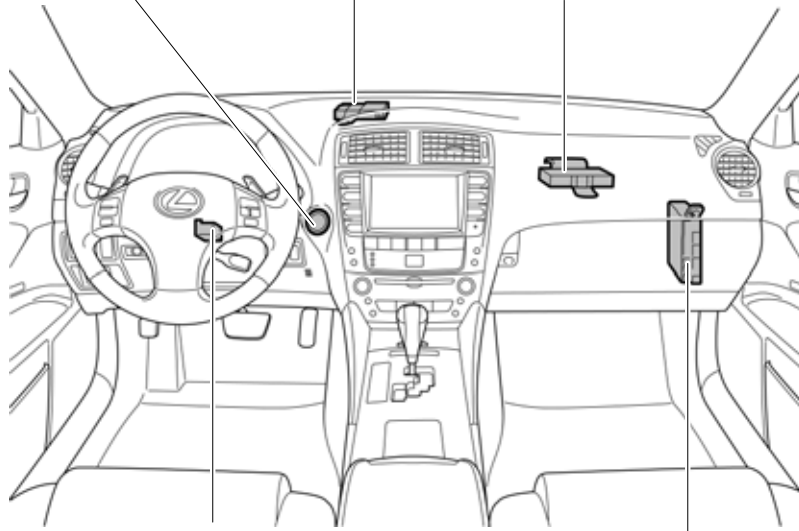
3. Layout of Main Component

Engine Switch

- Transponder Key Amplifier

ID Code Box

Power Source Control ECU



Steering Lock Assembly

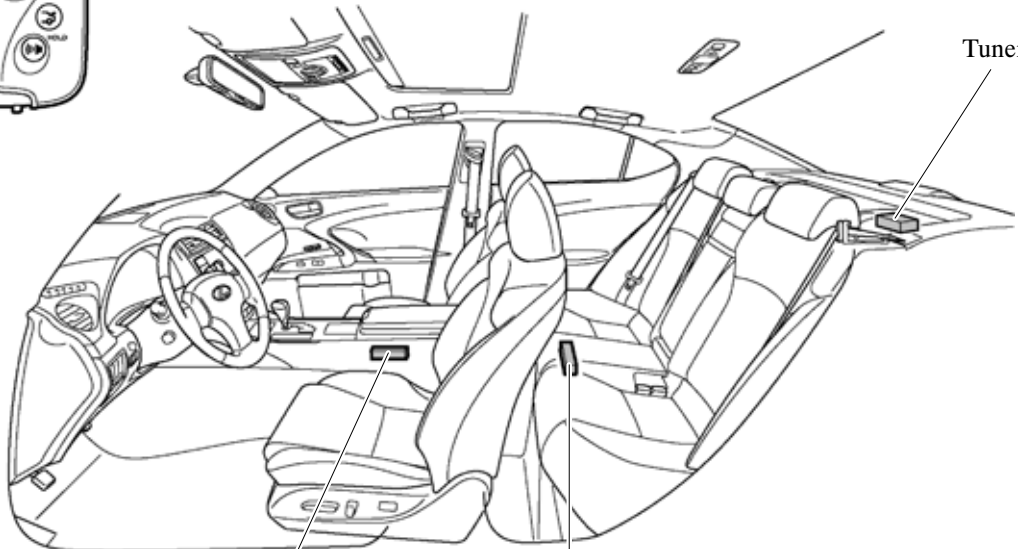
- Steering Lock/Unlock Detection Switch
- Steering Lock ECU
- Steering Lock Motor

Cowl Side J/B RH

- Main Body ECU RH

0140BE128Z

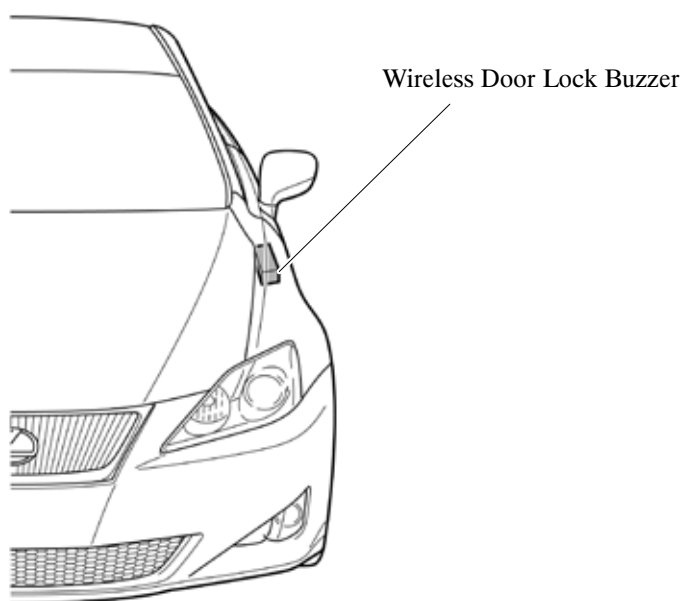
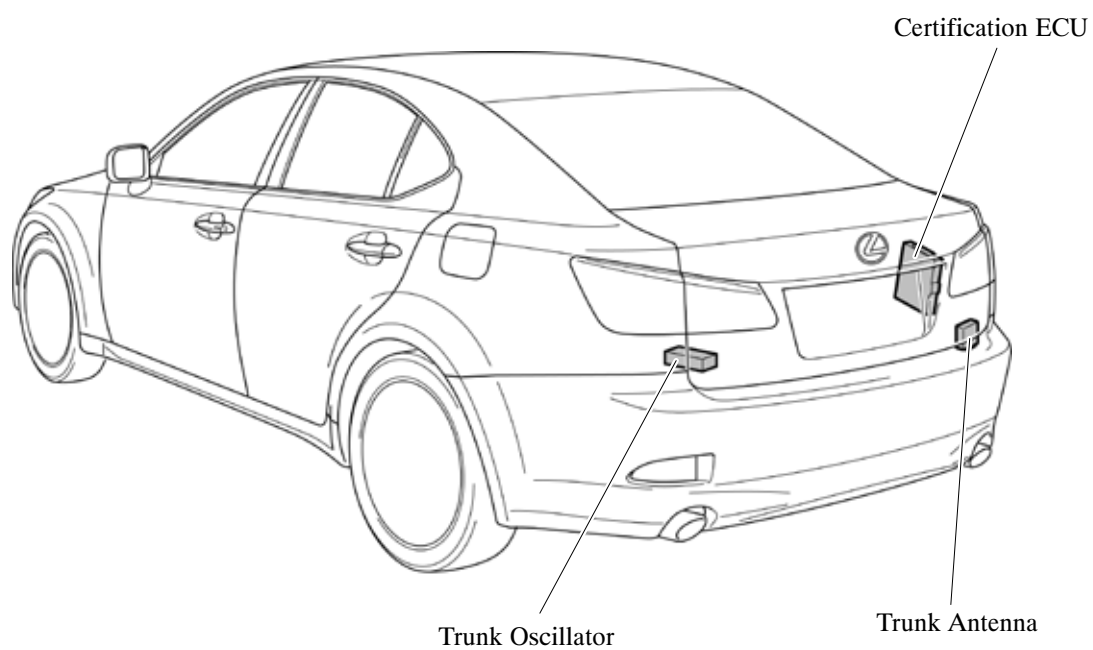
Key



Room Oscillator
(Front)

Room Oscillator
(Rear)

0140BE129Z



BE

0140BE165Z

4. Function of Main Component

Component	Function
Engine Switch • Transponder Key Amplifier	• Transmits the engine switch signal to the Power Source Control ECU. • Informs the driver of a power source or system abnormality based on the illumination stage of the indicator light. • Receives the ID code and transmits it to the Certification ECU when the key battery is too weak to respond to the tuner based on the room oscillators.
Key	Receives the signals from oscillators and returns the ID code to the tuner. For details, see page BE-164 .
Room Oscillator • Front and Rear	Receives a request signal from the Certification ECU and forms the actuation area in the vehicle interior.
Tuner	Receives the ID code from the key and transmits it to Certification ECU.
Power Source Control ECU	• Switches the power source in four modes (OFF, ACC, IG-ON, START) in accordance with the shift position and the state of the stop light switch. • Controls the push button start system in accordance with the signals received from the switches and each ECU.
Certification ECU	Certifies the ID code received from the tuner and transmits the certification results to the ID code box and Steering Lock ECU.
Stop Light Switch	Outputs the state of the brake pedal to Power Source Control ECU.
Clutch Start Switch	Outputs the state of the clutch pedal to Power Source Control ECU.
ID Code Box	Receives the steering unlock or engine immobilizer disengage signals from the Certification ECU, certifies them, and transmits each disengage signal to the Steering Lock ECU or Engine ECU.
Engine ECU	• Receives the engine start request signal from the Power Source Control ECU, turns ON the ST relay, and starts the engine. • Receives the signal from the ID code box and performs engine ignition and injection.

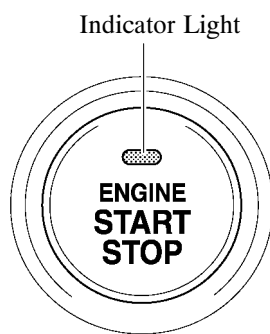
5. Construction and Operation

Engine Switch

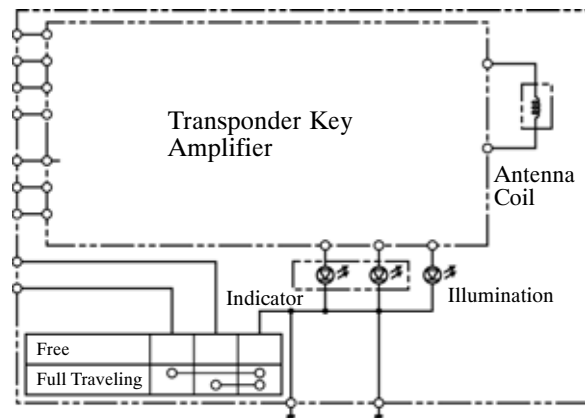
The Engine switch consists of a momentary type switch, two color (Amber, Green) LEDs, and transponder key amplifier.

- The amber and green LEDs are for the indicator light.
- The driver can determine the present power source and check whether the engine can start or not in accordance with the illumination state of the indicator light.
- When the Power Source Control ECU detects an abnormality with the push button start system, it makes the amber indicator light flash. If the engine is stopped in this state, it might not be possible to restart it.

► Circuit Diagram ◀



263BE05



285BE66

BE

► Indicator Light Condition ◀

Power Source Condition	Indicator Light Condition	
	Brake pedal not depressed	Brake pedal depressed with shift lever in "P" or "N".
OFF	OFF	ON (Green)
ACC, IG-ON	ON (Amber)	ON (Green)
Engine Running	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 seconds	Flashes (Green) for 15 seconds
Push Button Start System Malfunction	Flashes (Amber) for 15 seconds	Flashes (Amber) for 15 seconds

6. Start Function Operation

General

1) A/T Models

- The start function has different power source patterns to suit the brake pedal state and shift lever position.

Pattern	Brake Pedal	Shift Lever	Power Source Pattern
A	Depressed	P or N Position	When the engine switch is pushed once. • OFF → IG ON (after the engine is started)
B	Not Depressed	P Position	Each time the engine switch is pushed. • OFF → ACC → IG ON → OFF
C		Except P Position	Each time the engine switch is pushed. • OFF → ACC → IG ON → ACC
D	—	P Position	When the engine switch is pushed in the IG-ON condition. • IG ON (engine is started or not started) → OFF
E	—	Except P Position	When the engine switch is pushed in the IG-ON condition. • IG ON (engine is started or not started) → ACC

► Transition of Power Mode ◀

Shift Position		P			N		Except P, N	
Pattern		B or D	A or B	—	C or E	A or E	C or E	—
Engine Switch		Push	Push	—	Push	Push	Push	Push
Brake		—	Depressed	—	—	Depressed	—	Depressed
Hour		—	—	After 1 hour	—	—	—	—
Power Source	OFF							
	ACC							
	IG							
	Engine Start							

- : Transition
 : Only when the key certification is OK
 : Only when the vehicle is stopped

285BE144

2) M/T Models

- The start function has different power source patterns to suit the clutch pedal state.

Pattern	Brake Pedal	Power Source Pattern
A	Depressed	When the engine switch is pushed once. • OFF → IG ON (after the engine is started)
B	Not Depressed	Each time the engine switch is pushed. • OFF → ACC → IG ON → OFF
D	—	When the engine switch is pushed in the IG-ON condition. • IG ON (engine is started or not started) → OFF

► Transition of Power Source ◀

Pattern	B or D	A or B	—
Engine Switch	Push	Push	—
Brake	—	Depressed	—
Hour	—	—	After 1 hour
Power Source	OFF		
	ACC		
	IG		
	Engine Start		

◀ : Transition

◀ : Only when the key certification is OK

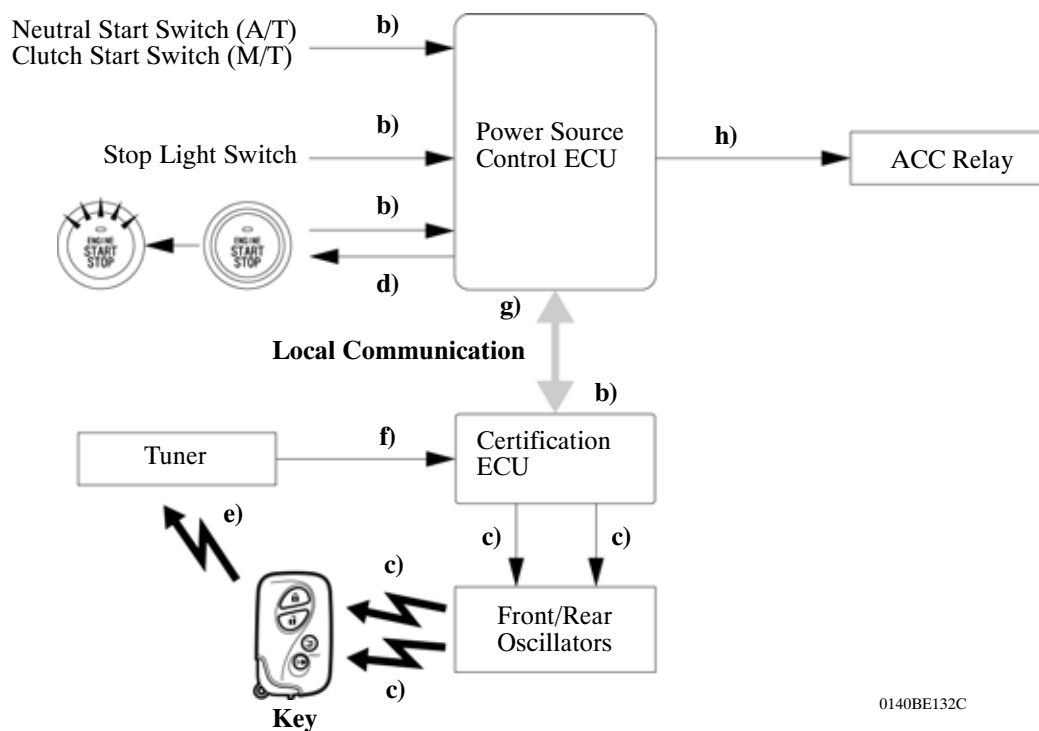
◀ : Only when the vehicle is stopped

0140BE131C

- When the key battery is low, the start function can be made to function by holding the key against the engine switch. For details, [see page BE-157](#).

Pattern A: OFF → IG-ON (after the engine is started)

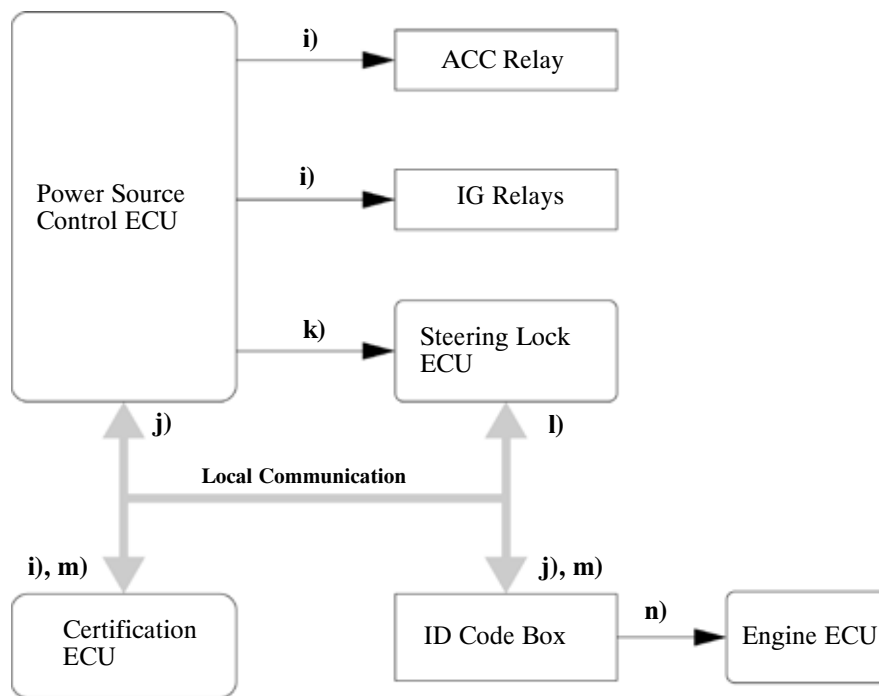
Step	System Operation
a)	The driver holds the key and enters the vehicle.
b)	When the driver presses the engine switch once with the following conditions satisfied, the Power Source Control ECU recognizes the engine switch signal and transmits the key certification request to the Certification ECU. • Shift position is “P” or “N”. (A/T models) • Brake pedal depressed. (A/T models) • Clutch pedal depressed. (M/T models) • Power source is at “OFF”.
c)	The Certification ECU receives the certification request and transmits a request signal to the front/rear oscillators. These oscillators then transmit the request signal.
d)	The brake pedal is depressed, so the Power Source Control ECU turns ON the green indicator light of the engine switch.
e)	The moment the key receives the request signal, it returns ID code to the tuner an that includes the response code.
f)	The tuner receives this code and transmits it to the Certification ECU.
g)	The Certification ECU judges and certifies the ID code, and transmits a key certification OK signal to the Power Source Control ECU.
h)	After receiving the key certification OK signal, the Power Source Control ECU turns ON the ACC relay.



0140BE132C

(Continued)

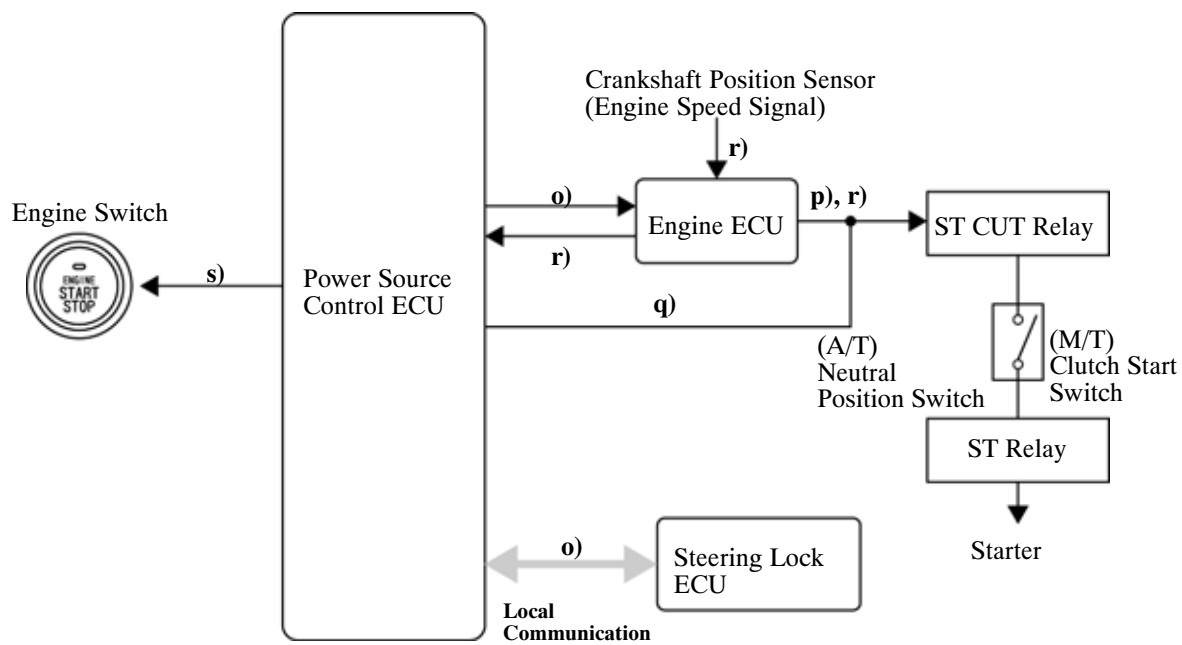
Step	System Operation
i)	Power Source Control ECU turns ON the ACC relay, and then turns ON the IG relays.
j)	Certification ECU checks that the power source has switched from OFF to IG-ON, and transmits a steering unlock signal to the Power Source Control ECU and ID code box.
k)	Power Source Control ECU receives this signal and supplies power to the Steering Lock ECU.
l)	Steering Lock ECU receives the steering unlock signal via the ID code box, and releases the steering lock.
m)	After checking the steering unlock condition, the Certification ECU transmits an engine immobilizer disengage signal to the ID code box.
n)	The ID code box certifies the disengage signal of the Certification ECU, transmits the engine immobilizer disengage signal to the Engine ECU, and disengages the engine immobilizer.



0140BE133C

(Continued)

Step	System Operation
o)	After checking that the steering is in the unlocked condition, the Power Source Control ECU transmits a starter request (STSW) signal to the Engine ECU.
p)	The Engine ECU receives this signal, outputs an ST relay (STAR) signal, and actuates the starter. (For details see the cranking hold function on page EG-77.)
q)	The Engine ECU and Power Source Control ECU both output the starter relay signal in order to actuate the starter. Both the Engine ECU and ECU output the signal in order to prevent situations where the starter may fail to operate, such as when the battery voltage supplied to the Engine ECU is low.
r)	When the Engine ECU judges from the engine speed that engine start is completed, it stops the starter relay (STAR) signal, and stops the starter.
s)	The Power Source Control ECU receives this signal, checks that engine start is completed, and turns OFF the indicator light of the engine switch.



0140BE134C

(Continued)

Pattern B: OFF → ACC → IG ON → OFF**1) OFF → ACC**

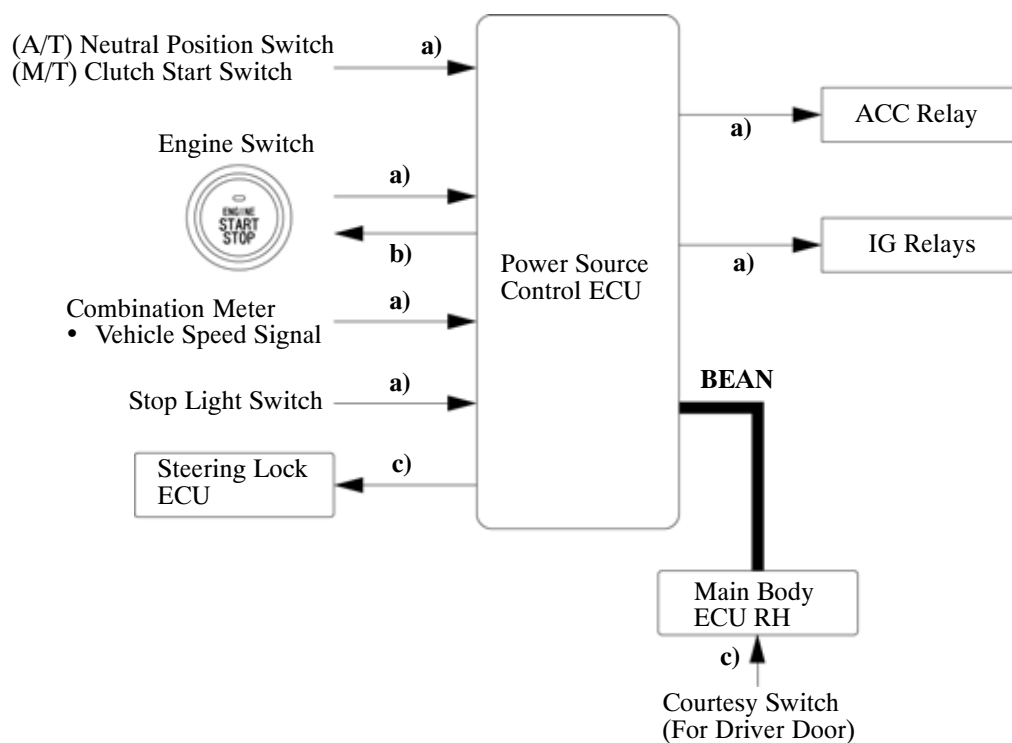
Step	System Operation
a)	The driver has the key in their possession and enters the vehicle.
b)	When the driver presses the engine switch once with the following conditions satisfied, the Power Source Control ECU recognizes the engine switch signal and transmits the key certification request to the Certification ECU. • Shift position is “P”. (A/T models) • Brake pedal is not depressed. (A/T models) • Clutch pedal is not depressed. (M/T models) • Power source is “OFF”.
c)	Due to the brake pedal not being depressed, the Power Source Control ECU will turn ON the amber indicator light of the engine switch.
d)	The rest of the system operation is the same as d) to h) in pattern “A” . For details, see page BE-151 .

2) ACC → IG ON

Step	System Operation
a)	When the power source is at “ACC” and the driver pressed the engine switch again, the Power Source Control ECU recognizes the engine switch signal and turns ON the IG relays.
b)	The rest of the system operation is the same as j) to n) in pattern “A” . For details, see page BE-152 .

3) IG ON → OFF

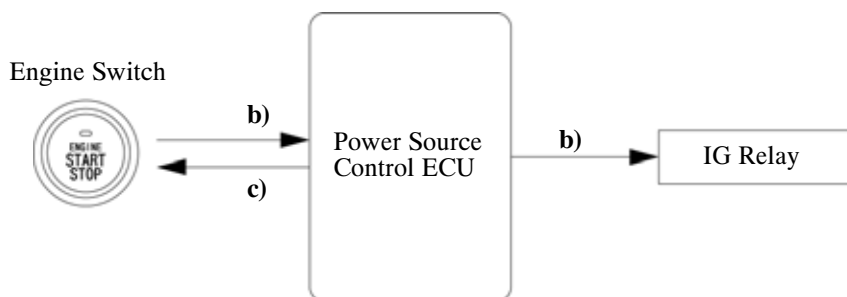
Step	System Operation
a)	When the engine switch is pressed once with the following conditions satisfied, the Power Source Control ECU recognizes the engine switch signal and turns OFF the ACC, IG relays. • Shift position is “P”. (A/T models) • Brake pedal is not depressed . (A/T models) • Clutch pedal is not depressed . (M/T models) • Vehicle speed is 0 km/h (0 mph). • Power source is in “IG-ON” mode.
b)	When the power source is switched from IG-ON to OFF, the Power Source Control ECU will turn OFF the indicator light of the engine switch.
c)	If the driver’s door is opened, the Power Source Control ECU receives a signal from the Main Body ECU RH. Then, power supply to the Steering Lock ECU stops in order to lock the steering.



BE

Pattern C: OFF → ACC → IG ON → ACC (A/T Models)

Step	System Operation
a)	The system operations for the power source “OFF → ACC → IG ON” are the same as those in pattern B. For details, see page BE-154 .
b)	When the engine switch is pressed once with the following conditions satisfied, the Power Source Control ECU recognizes the engine switch signal and turns OFF the IG relays. • Shift position is in any position except “P”. • Brake pedal is not depressed. • Vehicle speed is 0 km/h (0 mph). • Power source is in “IG-ON” mode.
c)	Even after the power source switches from IG ON to ACC, the indicator light of the engine switch will remain illuminated in amber.



0140BE136C

Pattern D: IG ON → OFF

This system operation is the same as IG ON → OFF for pattern “B”. For detail, [see page BE-154](#).

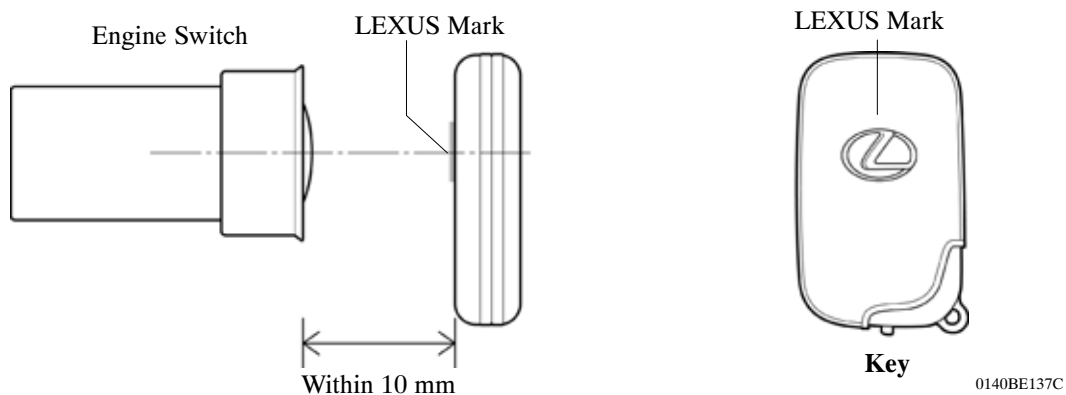
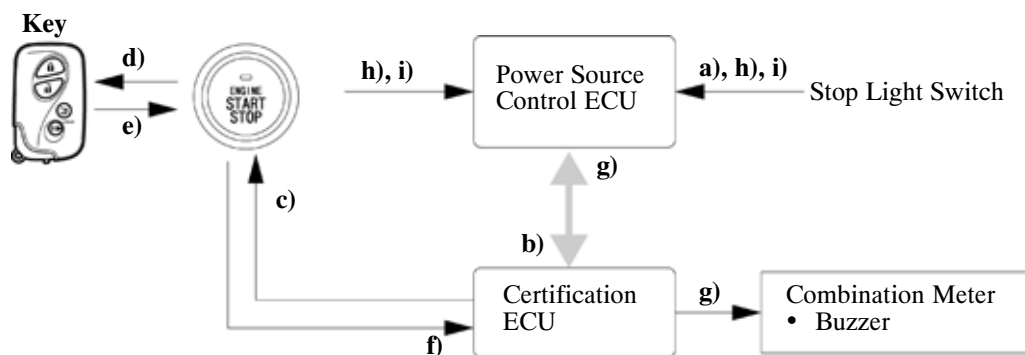
Pattern E: IG ON → ACC (A/T Models)

This system operation is the same as pattern “C”. For details, see page BE-156. However, the indicator light of the engine switch will illuminate as follows:

- When the power source is switched from IG-ON to ACC, the Power Source Control ECU makes the amber indicator light of the engine switch continue to illuminate.
- When the power source is switched from engine running to OFF, the Power Source Control ECU turns OFF the indicator light of the engine switch.

When key battery is low

Step	System Operation
a)	To operate the push button start system when the key battery is low, hold the LEXUS mark of the key against the engine switch while depressing the brake pedal.
b)	The Power Source Control ECU receives the stop light switch signal and transmits a key certification request signal to the Certification ECU.
c)	The Certification ECU does not receive an ID code response from the tuner, so it actuates the transponder key amplifier built in to the engine switch.
d)	The transponder key amplifier outputs an engine immobilizer radio wave to the key.
e)	The key receives the radio wave, and returns a radio wave response to the transponder key amplifier.
f)	The transponder key amplifier combines the key ID codes with the radio wave response, and transmits it to the Certification ECU.
g)	The Certification ECU judges and verifies the ID code, and transmits a key certification OK signal to the Power Source Control ECU. The buzzer in the combination meter sounds at the same time.
h)	After the buzzer sounds, if the engine switch is pressed within five seconds while the brake pedal is depressed, the power source switches to start the engine running, the same as with normal smart key operation.
i)	After the buzzer sounds, if the engine switch is pressed within five seconds while the brake pedal is not depressed, the power source will be switched to ACC or IG-ON, the same as with normal smart key operation.

**BE**

0140BE138C

7. Diagnosis

Power Source Control ECU and Certification ECU can detect malfunctions in the push button start system when the power source is in the IG-ON mode.

When the ECUs detect a malfunction, the amber indicator light of the engine switch flashes to warn the driver. At the same time, the ECUs store 5-digit DTCs (Diagnostic Trouble Codes) in their memory.

- The indicator light warning continues for 15 seconds even after the power source is switched to OFF.
- The DTC can be read by connecting a hand-held tester to the DLC3.
- The push button start system may not operate successfully if a malfunction occurs.